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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,189	12/03/2003	Robert Pezzani	S1022.81078US00	5186

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BOSTON, MA 02210-2206

EXAMINER
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ROMAN, LUIS ENRIQUE

ART UNIT	PAPER NUMBER
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2836

MAIL DATE	DELIVERY MODE
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05/30/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/727,189

Applicant(s)

PEZZANI, ROBERT

Examiner

Luis Roman

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 February 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 02/14/07 has been entered.

Applicant amendment filed on 02/14/07 has been entered. Accordingly no claims have been kept original, claims 1-2 & 8 have been amended and no claims have been cancelled. New claims 13-43 were added new. It also included remarks/arguments.

### **Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this office action:

A person shall be entitled to a patent unless –  
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1, 2 & 26** are rejected under 35 U.S.C. § 102(b) as being anticipated by Shinoda (US 4779036).

Regarding claims 1 & 26 Shinoda discloses a method (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) for controlling an SCR-type switch (Fig. 5 elements 70a-f), comprising applying on the switch gate several periods of an unrectified high frequency voltage

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(Col. 5 lines 11-17 & Fig. 8F), the power of each halfwave of the unrectified high frequency voltage being insufficient to start the SCR-type switch (Fig. 8F shows a frequency burst or plurality of halfwaves to provide sufficient energy to start the SCR-type switch).

Regarding claim 2 Shinoda discloses the method of claim 1, wherein the high frequency voltage oscillates at a selected frequency between 10 kHz and a few GHz (Col. 5 lines 67-68).

**Claim 25** is rejected under 35 U.S.C. § 102(b) as being anticipated by J. A. Nuckolls (US 3344310).

Regarding claim 25 J. A. Nuckolls discloses a method (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) of controlling an SCR-type switch (Fig. 1), the method comprising: providing a control signal to a gate of the SCR-type switch (7 & 8) that controls the SCR-type wherein the control signal is provided to the gate through a capacitor (56 & 57).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 8-11, 13-15 & 17-23** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Iwamuro et al. (US 6091087).

Regarding claims 8 & 13 Shinoda discloses an SCR-type switch component (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) (Fig. 5 elements 70a-f), comprising two main electrodes (Fig. 5 anodes and cathodes of elements 70a-f) and at least one control electrode (Fig. 5 gates of elements 70a-f) controlling the SCR-type switch component in response to an unrectified high frequency power supply (Col. 5 lines 11-17 & Fig. 8F <shows a frequency burst to provide sufficient energy to start the SCR-type switch>).

Shinoda does not specifically disclose that the SCR-type switch component with the gate formed on an insulating layer that insulates the control electrode from a starting region of the component (for claim 8).

Shinoda does not specifically disclose that the control of the SCR-type switch controls without supplying current from the control terminal to the starting area of the SCR-type switch (for claim 13).

Iwamuro et al. teaches an insulated gate thyristor (Fig. 1), which has the gate, formed on an insulating layer that insulates the control electrode from a starting region of the component (9 <oxide film>, 10 <gate electrode>). Because this insulation there is not supplied current to the starting region of the component.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the insulated gate thyristor of Iwamuro et al. because greatly contributes to reduction of switching losses in a power switching apparatus using these devices (Iwamuro et al. <Col.18 lines 33-36>).

Regarding claim 9 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8.

Iwamuro et al. further discloses wherein the control electrode is arranged above a gate region of a thyristor (Fig. 1).

Regarding claim 10 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8 but does not disclose wherein the control electrode is arranged above a gate region of a triac.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with a triac because a thyristor provides only unidirectional rectification and a triac would provide bidirectional rectification. Note that a triac is a configuration of a pair of thyristor connected back to back.

Regarding claim 11 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8.

Shinoda further teaches wherein the control electrode is a high-frequency line having terminals for connection to the high frequency power supply (Col. 6 lines 7-13 & Fig. 5 elements 70 a-f).

Regarding claim 14 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 13.

Shinoda further discloses wherein the high frequency voltage oscillates at a selected frequency between 10 kHz and a few GHz (Col. 5 lines 67-68).

Regarding claim 15 Shinoda in view of Iwamuro et al. discloses the claimed invention except for the range of 1 MHz or higher. It would have been obvious to one having ordinary skills in the art at the time the invention was made to increase the workable range from 10 KHz to 1 MHz or higher, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 17 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Iwamuro et al. further teaches wherein the control terminal is insulated from the starting area (Fig. 1 elements 9 & 10).

Regarding claims 18-21 Shinoda in view of Iwamuro et al. discloses the method of claims above.

Shinoda further teaches wherein the high-frequency control voltage comprises a plurality of halfwaves, wherein each one of the plurality of halfwaves is individually insufficient to turn on the SCR-type switch (Col. 5 lines 11-17 & Fig. 8F shows a frequency burst or plurality of halfwaves to provide sufficient energy to start the SCR-type switch). Note that the power, voltage and duration of a signal are all related to the energy provided to the switch, which has a minimal value to each in order to be turned on.

Regarding claim 22 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Shinoda further discloses wherein the SCR-type switch is only turned on in response to a combined effect of a plurality of halfwaves of the high-frequency control voltage but is not turned on in response to an effect of an individual one of the plurality of halfwaves (Fig. 8F shows a frequency burst or plurality of halfwaves to provide sufficient energy to start the SCR-type switch).

Regarding claim 23 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Shinoda further discloses wherein the high-frequency control voltage is unrectified (Fig. 8F).

**Claims 3-6** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Yuan et al. (Patent Application Publication US 2002/0066904 A1).

Regarding claim 3 Shinoda discloses the method of claim 1.

Shinoda does not disclose wherein the high frequency is applied via an insulating layer formed above a sensitive area of the component.

Yuan et al. teaches wherein the high frequency voltage is applied via an insulating layer (Pg. 3 paragraph 33-34 & Fig. 1 element 104) formed above a starting area of the component (Pg. 3 paragraph 33-34 & Fig. 1 element 102).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the Yuan et al. device features because both teach how to efficiently control the triggering of an semiconductor switch and the configuration of the radiation sensitive device (photodetector) of Yuan et al. provides an apparatus with better isolation which will prevent erroneous triggering of the switch.

Regarding claim 4 Shinoda in view of Yuan et al. disclose the method of claim 3. Yuan et al. further discloses wherein the high frequency voltage is applied above a gate region of a thyristor (Col. 4 paragraph 45).

Regarding claim 5 Shinoda in view of Yuan et al. disclose the method of claim 3. Yuan et al. further discloses wherein the high frequency voltage is applied above a gate region of a triac (Col. 4 paragraph 45).

Regarding claim 6 Shinoda in view of Yuan et al. disclose the method of claim 3. Shinoda further teaches wherein the high frequency voltage is applied via a high-frequency line having terminals for connection to the high frequency voltage (Fig. 5 elements 70 a-f).

**Claim 7** is rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Yuan et al. (Patent Application Publication US 2002/0066904 A1) and Spink (US 3824444).



Regarding claim 7 Shinoda in view of Yuan et al. disclose the method of claim 3. Shinoda in view of Yuan et al. does not disclose wherein the high frequency is applied via a winding thru an external connection of the device.

Spink teaches wherein the high frequency voltage is applied via a winding that generates a magnetic field or responds to a magnetic field (Fig. 1 elements GT1, GT2, GT3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda and Yuan et al. device with the winding of Spink to provide better isolation for the control gate of the semiconductor.

**Claims 12 & 24** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Iwamuro et al. (US 6091087) and Spink (US 3824444).

Regarding claim 12 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8.

Shinoda in view of Iwamuro et al. does not disclose wherein the high frequency is applied via a winding that generates a magnetic field or responds to a magnetic field.

Spink teaches wherein the high frequency is applied via a winding that generates a magnetic field or responds to a magnetic field (Fig. 1 elements GT1, GT2, GT3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Iwamuro et al. device with the winding of Spink because this device is in the same solving problem area and provides better isolation for the control gate or connection of the semiconductor.

Regarding claim 24 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Spink teaches wherein the high frequency is applied via a winding that generates a magnetic field or responds to a magnetic field (Fig. 1 elements GT1, GT2, GT3).

**Claim 16** is rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Iwamuro et al. (US 6091087) and J. A. Nuckolls (US 3344310).

Regarding claim 16 Shinoda in view of Iwamuro et al. discloses the method of claim 13 but does not teach wherein the high frequency control voltage is provided to the control terminal through a capacitor.

J. A. Nuckolls teaches controlling an SCR-type switch (Fig. 1 elements 7 & 8) wherein the high frequency control voltage is provided to the control terminal through a capacitor (Fig. 1 elements 56 & 57).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Iwamuro et al. device with the capacitor of J. A. Nuckolls because it provides isolation from the circuit by providing AC coupling.

**Claims 27-28 & 33-43** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Bhagat (US 4630092).

Regarding claim 27 Shinoda discloses an SCR-type switch component (Fig. 5 elements 70a-f), comprising two main electrodes (Fig. 5 anodes and cathodes of elements 70a-f) and at least one control electrode (Fig. 5 gates of elements 70a-f) controlling the SCR-type switch component in response to an unrectified high frequency power supply (Col. 5 lines 11-17 & Fig. 8F <shows a frequency burst to provide sufficient energy to start the SCR-type switch>).

Shinoda does not specifically define the starting region and insulating region.

Bhagat teaches a starting region (Fig. 2 elements 32, 34, 36) and insulating region (Fig. 2 elements 40, 46).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the insulated gate thyristor of Bhagat because this thyristor with insulated gate provides rapid turn-off even when anode voltage stays high (Bhagat <Col. 1 lines 66-68>).

Regarding claim 28 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the first control electrode is completely insulated from the starting region (Fig. 2 elements 42, 40, 46)

Regarding claim 33 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the first control electrode is insulated, via the insulating layer, from a semiconductor substrate in which semiconductor layers of the SCR-type switch component are formed (Fig. 2).

Regarding claim 34 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses a second control electrode that is insulated from the starting region by the insulating region (Fig. 2 elements 42, 40, 46)

Regarding claim 35 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the starting region comprises a first region of a first conductivity type (Fig. 2 element N) and a second region of a second conductivity type (Fig. 2 element P), wherein the first control electrode is closer to the first region than to the second region (Fig. 2 element 44, N), and wherein the second control electrode is closer to the second region than to the first region (Fig. 2 element 42, PN).

Regarding claim 36 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the first control electrode contacts the insulating region (Fig. 2 elements 44, 40, 46).

Regarding claim 37 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the insulating region contacts the starting region (Fig. 2 elements 40, N).

Regarding claim 38 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27 but does not disclose wherein the control electrode is arranged above a gate region of a triac.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Bhagat device with a triac because a thyristor provides only unidirectional rectification and a triac would provide bidirectional rectification. Note that a triac is a configuration of a pair of thyristor connected back to back.

Regarding claim 39 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Shinoda further teaches wherein the SCR-type switch is a thyristor (Fig. 5 elements 70a-f).

Regarding claim 40 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Shinoda further teaches wherein the SCR-type switch is controlled by applying a high-frequency control voltage to the control electrode (Fig. 8F).

Regarding claim 41 Shinoda in view of Bhagat discloses the SCR-type switch of claim 40.

Shinoda further teaches wherein the SCR-type switch is only turned on in response to a combined effect of a plurality of halfwaves of the high-frequency control voltage but is not turned on in response to an effect of an individual one of the plurality

of halfwaves (Fig. 8F shows a frequency burst or plurality of halfwaves to provide sufficient energy to start the SCR-type switch).

Regarding claim 42 Shinoda in view of Bhagat discloses the SCR-type switch of claim 40 except for the range of 1 MHz or higher. It would have been obvious to one having ordinary skills in the art at the time the invention was made to increase the workable range from 10 KHz to 1 MHz or higher, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 43 Shinoda in view of Bhagat discloses the SCR-type switch of claim 40.

Bhagat further teaches wherein the high-frequency control voltage controls the SCR-type switch without supplying current from the control terminal to the starting area (Fig. 2 elements 40, 46 <these insulations do not allow conduction of current>).

**Claim 29** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Bhagat (US 4630092) and Spink (US 3824444).

Regarding claim 29 Shinoda in view of Bhagat disclose the SCR-type switch method of claim 27.

Shinoda in view of Bhagat does not disclose wherein the control electrode is inductively coupled to the starting region via the insulating region.

Spink teaches wherein the control electrode is inductively coupled to the starting region via the insulating region (Fig. 1 elements GT1, GT2, GT3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Bhagat device with the winding of Spink to provide better isolation for the control gate of the semiconductor.

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**Claims 30-32** are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Bhagat (US 4630092) and J. A. Nuckolls (US 3344310).

Regarding claim 30 Shinoda in view of Bhagat discloses the SCR-type switch method of claim 27.

Shinoda in view of Bhagat does not disclose wherein the first control electrode is capacitively coupled to the starting region via the insulating region.

J. A. Nuckolls teaches disclose wherein the first control electrode is capacitively coupled to the starting region via the insulating region (Fig. 1 element 56).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Bhagat device with the capacitor of J. A. Nuckolls because it provides isolation from the circuit by providing AC coupling.

Regarding claim 31 Shinoda in view of Bhagat and J. A. Nuckolls discloses the SCR-type switch method of claim 30.

Bhagat further teaches wherein the first control electrode contacts the insulating region (Fig. 2 elements 44, 40).

Regarding claim 32 Shinoda in view of Bhagat and J. A. Nuckolls discloses the SCR-type switch method of claim 31.

Bhagat further teaches wherein the insulating region contacts the starting region (Fig. 2 elements 40, 32, 34, 36).

### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luis E. Román whose telephone number is (571) 272-5527. The examiner can normally be reached on Mon – Fri from 7:15 AM to 3:45 PM.

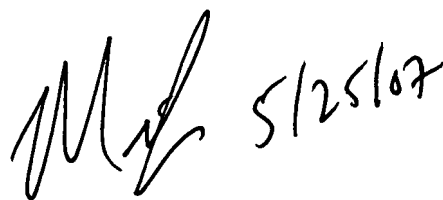
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on (571) 272-2084. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from Patent Application Information Retrieval (PAIR) system.

Status information for unpublished applications is available through private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the private PAIR system, contact the Electronic Business Center (EBC) at (866) 217-9197 (toll-free).

LR/052407

Luis E. Román  
Patent Examiner  
Art Unit 2836

A handwritten signature, likely of Michael Sherry, followed by the date 5/25/07.

MICHAEL SHERRY  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800